ENVIRONMENTAL ASSESSMENT

DEVELOPED TECHNOLOGY RESOURCE DAIRY PROJECT

UMAN, UKRAINE

Under the auspices of

Citizens Network for Foreign Affairs, Kiev, Ukraine

and the

United States Agency for International Development

Cooperative Agreement No. 121-0006-A-00-6238-00

Agribusiness Partnerships II Project

by

Wayne T.Williams
Zoya A. Drozdova
Jo Anne Williams

Citizens Network for Foreign Affairs
Kiev, Ukraine

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USAID REGULATION 22 CFR 216.2

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1) SUMMARY

The objective of this Environmental Assessment is to bring the DTR (Developed Technology Resources) Uman dairy operation into compliance with current and planned environmental regulations of Ukraine and the pertinent regulations of the United States Agency for International Development, based on 22 CFR Regulation 216. This EA is based on the Initial Environmental Examination, various CNFA/USAID reports and memorandums, results of radionuclides analyzes, on local authorities inspections and several site visits by CNFA personnel. Many interviews and discussions with DTR personnel have occurred regarding the Environmental Assessment. The rehabilitation process of DTR at the Uman Dairy is considered to result in significant environmental improvements versus previous conditions. The increased value-added production has positive multiplier effects for environment and economics in the region affecting the whole milk-processing circuit. All necessary licences and permits for the operation of the dairy are in order.

1.1 Mitigations Recommended and Progress Toward Achieving Them

This project is an example of a deferential approach to the environment. DTR and Uman Dairy have put much effort in transforming the processing cycle into an environmentally friendly enterprise. The project proposal includes a detailed plan to increase the quality of milk and to reduce pollution from the dairy.

1.1.1 Raw Milk Quantity and Quality

The principal problem that the dairy industry now faces is a lack of quality raw milk for processing. Animal populations in Ukraine have plummeted to post World War II levels. The primary reasons for this decline are fourfold: poor nutrition, disease, poor management and lack of an efficient marketing system. The lack of balanced feed is a critical factor for the decline in nutrition. The situation is exacerbated by the absence of updated western knowledge in the dairy field. Milk production is only 2 liters per cow per day. Dairies must strike a balance between maintaining quality standards and obtaining enough milk to meet demands. As a result, milk low in nutrition and affected by diseases, including tuberculosis, leucosis and possibly brucellosis, is distributed to market. Therefore, one of the main focal points of this project will be to provide a dependable and sufficient source of raw milk high in nutrition that is disease free. The project will provide a dairy farm training program and credit facility to assist farms in its sphere of influence to increase the quality and quantity of milk supply. Critical to a satisfactory milk supply is cash payment on receipt of milk to the farmers, a new and much needed practice which will stimulate quality milk production.

1.1.2 Nutritional Value

Reorientation of the private sector focusing on correct nutrition for the cows will also improve

the nutritional value of milk. Supplies of antibiotics, vitamins and mineral supplements, feed grains and cleaning materials will be made available to the farms. Preliminary analysis equipment will be installed in every milk collection site.

1.1.3 Analysis for Radionuclides

Uman Dairy is situated at the edge of the zone contaminated by the Chernobyl nuclear power plant disaster (map, Appendix D). Because the new Ukrainian radiation standards are strict, a baseline radiation study was initiated. In addition, CNFA worked frequently with DTR to obtain environmental clearance regarding radiation conditions with the U.S. Agency, OPIC required for loan guarantees. Project development funds from AP-II were provided to carry out an initial radiation survey with milk samples from 12 farms servicing the dairy (Section 1.1.3.1). In addition, a protocol for radiation measurement was written for the dairy taken from the recent Ukrainian laws on radiation in milk products (Section 1.1.3.2) and specifically applied to the DTR Uman situation.

1.1.3.1 Preliminary Results of the Analyses

Milk samples were submitted to Kyiv National University, Nuclear Spectrometry Laboratory. The analyses revealed low levels of the main radionuclide contaminants, Cesium, Strontium and Uranium (Cs, Sr, U-row). The mean combined radiation is $\sim 2 \cdot 10^{-11}$ Ci/l (X Bq/l) for Sr plus Cs. The maximum permissible limit in Ukraine for Cs^{137} is 100 Bq/l, and for Sr^{90} - $1 \cdot 10^{-9}$ Ci/l (25 Bq/l). The head of the Uman Dairy laboratory was of the opinion that they are measuring the content of Cs. However, the device they use measures combined B- activity. Many radionuclides have B-decay (Sr and partly Cs are among them). The mean results submitted by Kyiv University are ~7- <1 Bq/l for both Sr and Cs. Consequently the milk is about 100 times lower than standard. Activity was also detected emanating from the elements of the Uranium row (Uranium and Radium). The results are listed in Table 1.

Table 1: The Results of Measurement of - and -activity of the Milk Samples

#	Name of village	Specific activity, Bq/l, (error, %)

		^{40}K ( )	**^{137}Cs ( )**	**U ( )**	**^{90}Sr ( )**
15	Ostrivets	28 (29)	<0.7	2.4 (50)	<1 (40)
16	Ivanivka	59 (23)	0.7 (80)	2.9 (50)	<1 (40)
17	Furmanka	18 (30)	<0.7	<1.5	<1 (40)
18	Tekucha	61 (22)	<0.7	1.5 (70)	<1 (40)
19	Ocherzhyntsi	29 (26)	<0.7	<1	<1 (40)
20	Kochubiivka	32 (25)	<0.7	<1	<1 (40)
21	Sobkovka	45 (25)	<0.7	1.7 (70)	<1 (40)
22	Polyanytsky	31 (26)	<0.7	<1	<1 (40)
23	Cherpovody	48 (25)	0.9 (70)	2.0 (60)	<1 (40)
24	Synytsya	43 (31)	<0.7	1.5 (70)	<1 (40)
25	Grodzeva	52 (22)	<0.7	2.8 (50)	<1 (40)
26	Ropotucha	27 (30)	<0.7	<1	<1 (40)

Considering that not all dairy farms have been analyzed, and that DTR wants to provide top quality products to its clientele, the following measures are mandatory:

1) radionuclide testing records, preferably dated from April, 1986 to the present time, must be provided. Future systematic regular testing of raw milk and final products must continue, especially tests for Cesium and Strontium. The equipment the dairy used previously measured only combined -activity (Beta) (both Cs ^{137} and Sr^{90} are -emitters), and the sensitivity was too low to provide consistent results;

- Records were examined and no exceedences were present.

2) the newly approved standards for Cs^{137} and Sr^{90} content in foodstuffs require new equipment, a method of preliminary samples separation for Sr^{90} and possibly a new system of monitoring. The government of Ukraine has not specified such a system to date nor has it come to an agreement whether it is possible to follow these new standards;

- DTR bought and installed Russian equipment that can provide the proper analyses.

3) a baseline study of incoming milk and possibly pasture lands and from individual cows of all the suppliers must be completed. Should highly contaminated farms be located, they must be excluded from the dairy processing. DTR's quarterly reports must reflect the current radiation situation at the dairy.

- The baseline study will continue during the summer of 1998.

1.1.3.2 Protocol for Radiation Measurement in Food Products in Ukraine

This section includes information required by OPIC and is applicable to dairy operations. The following points 1 - 2 g are interpreted from Russian, of Ukrainian laws and regulations concerning radiation measurement in food products in Ukraine. In certain cases, Ukraine accepted the statutes and regulations of the former U.S.S.R. The translation of the protocol is considered to be accurate and inclusive. Items three through seven are specific requirements of protocol deemed necessary during the AP-II project as compliance with 22 CFR Regulation 216.

The following procedure is used:

1. The Public Law of Ukraine "On Providing of Sanitary and Epidemiological Welfare of Populations" created the mandate to establish standards. In January of 1998, these new standards for radiation were written and approved by the Ministry of Public Health and went into effect. These standards are strict on an international comparison.

2 a. The following methods used were approved by the Chairman of State Standards of the former U.S.S.R., the Deputy Chairman of State AgroIndustrial complex of the U.S.S.R., the Deputy Chief of the State Sanitary and Physicians of U.S.S.R., by the Commission of Dosimetric Measurements and the Interim Ministerial Committee of Scientific Experts.

2 b. The method of analysis is by volume and specific activity of combined beta emitting nuclides in water, foodstuffs, plant products and animal husbandry by methods of direct measurement.

2 c. Only approved radiometers and their analogues can be used including:

Models PKB4-IeM, KPK-I, KPBII-3AB, III-100, CPII-68-OI. The old Uman Dairy model device is a Beta Radiometer model number CBT - 10 0D #0 039 326 with a main error of +/- 25% [Sr^{90} - Y^{90}], having a Diapason resolution limits of $5x10^{-9}$ curies per kilogram (Ci/kg) - $1x10^{-6}$Ci/kg. The new spectrophotometer Gamma Plus, is made in Russia.

2 d. The sensitivity of detection radiometers must be 1×10^{-9} Ci/kg for milk and 1×10^{-10} Ci/kg for water.

2 e. The maximum time of measurement of any one sample shall not be more than 1000 seconds, without concentrating the sample(s). Mean readings for the time interval are to be used in radiation determinations.

2 f. Samples will be taken from milk arriving at the plant after mixing from tanks from different depths using a specific sampling device. Each sample must have a volume of from 200 ml to one liter depending on how large the batch is that is sampled.

2 g. The laboratory at the dairy must be certified in terms of its methods and instrumentation by the Sanitary Epidemiological Inspection, Veterinarian and Agricultural Services.

- The Uman Dairy laboratory is certified.

The following comments describe additional criteria to be met for the Environmental Assessment being carried out by CNFA Environmental Office as requisite to compliance with US Agency for International Agency regulation 22CCFR Regulation 216.

2. The registration documents of milk sample radiation were inspected by personnel of the Environmental office of CNFA and they did not reveal any observations of radiation in excess of the standards. Every batch of milk was analyzed as recorded in the register. The register was correctly sealed containing pagination and signatures as required.

3. The preliminary analysis described above of radiation of potassium^{40}, cesium^{137}, strontium^{90} and uranium was completed for 12 dairy farms by CNFA. The radiation level in the milk was approximately 2 magnitudes lower than the new standard.

4. In addition to the continued radiation monitoring of milk samples as shipments arrive at the dairy, the following procedures will assure radiation control of the milk at the Uman dairy:

a) In the unexpected event that milk brought to the dairy is found to be in excess of the radiation standards, that milk will not be accepted for use at the dairy.

b) DTR will carry out a more precise radiation monitoring schedule consisting of monthly samples of raw milk sent to Kiev National University or other suitable testing laboratories for verification of the daily sampling in the dairy's laboratory. This sampling will determine actual levels of strontium^{90}, cesium^{137} and the actual quantity of other gross radiation emitters, including uranium.

5. A field baseline survey will be conducted at all of the current 27 dairy farms in the sphere of influence of the Uman dairy for radiation content of forage and possibly soil to determine the level of radiation. The samples will be analyzed in the KNU laboratories or other suitable laboratories following the previous protocol with CNFA projects. Should farms or pastures therein be found that have radiation greater than 1 Curie per km^2, milk from these farms will not be purchased by DTR/Uman until it can be more closely resolved whether or not certain portions of those affected farms might have cleaner pastures and forage in order to provide clean milk.

6. Results of this monitoring will be attached to quarterly reports of DTR to CNFA and related to USAID on a quarterly basis.

1.1.4 Prevention of Cattle Diseases

Verification of the general health of the local cattle population is mandatory. DTR must work with client dairy farms to control the current epidemics. The dairy has a separate processing line to process milk affected by tuberculosis into butter and casein. As the dairy begins its collection system

in the villages, they will have more opportunity to guarantee collection of cleaner milk.

1.1.5 Water Quality

Water used for processing and sanitation from both the city and DTR's own well has the assurance of the local Sanitary Epidemiological Inspection that the water meets the water quality standards. However, installation of a water purification system that includes water softening and filtering is warranted. Results of periodic tests of water quality must be provided in quarterly reports by DTR. These results will be an indicator of environmental compliance.

1.1.6 Basic Sanitation

Proper standards of sanitation must be followed. At present, the dairy is not as clean and orderly as it should be. It is operating at only 10% of its capacity. Following the example of the DTR/Hincesti dairy project in Moldova, it is expected that cleanliness will be improved as the dairy improves operations.

1.1.7 Sewer Effluents

Proactive analysis of wastewater mass flow and solid wastes is necessary. Installation of waste water pre-treatment equipment is recommended. The dairy has only a fat trap consisting of one cistern, and a series of sedimentation traps. Waste water treatment is provided by the city. DTR Uman must report at the earliest time possible in the quarterly report concerning progress made on the effluent system remodeling that was underway during April, 1998. DTR Uman, as with Hincesti, Moldova, must obtain information from the municipality regarding how close the dairy is to exceeding the present effluent standards to understand how much leeway exists.

1.1.8 Waste Disposal

The system of recycling paper and plastic products is satisfactory. Other materials are disposed of correctly.

1.1.9 Boilers and Air Emissions

Converting boilers to natural gas from mazut (a heavy viscous tar oil) will contribute to the reduction of pollution.

1.1.10 Cold Room Storage

Proper maintenance and repair of the ammonia refrigeration system is mandatory to avoid leaks and over consumption of the coolant. The Emergency Preparedness Plan for ammonia management should be reviewed as to sufficiency and the staff must be trained in how to handle ammonia leaks should they occur.

A. The ammonium refrigeration unit needs to be examined and repaired. Gas leaks are common and severe within the compressor room in particular and must be immediately repaired. The remaining leaky pipes pose health hazards to the workers and to the school, which is next to the dairy, and the residences across the street from the dairy.

B. All ammonium lines must be properly sealed and painted bright yellow with non-lead based paint for easy identification. Warning signs must be installed in all key locations.

C. A sufficient barrier needs to be built around the ammonium tanks to protect them from contact with vehicles.

D. The plant must purchase ammonium detectors and be placed in key locations to warn workers about the presence of ammonium gas.

E. An ammonium gas disaster preparedness plan needs to be implemented and all workers trained in ammonia safe usage and proper evacuation and first aid in case of a major leak. The school personnel and neighborhood also must be alerted to situation. Adequate warning signals, such as bells or sirens, need to be installed.

1.1.11 Noise Level

The dairy is located in the center of Uman near a residential part of the city. Currently, there are 40 various vehicles picking up products at the dairy every day. This is equal to 80 trips per day and is considered to be quite low in volume and therefore does not need mitigation. When the capacity quadruples, noise from the trucks could be more disruptive.

1.1.12 Permits and Licenses

All ecological and health permits and licenses must be examined for compliance. Monthly results must be included in the quarterly reports for the life of the project.

1.1.13 Emergency Preparedness Plan

A general Emergency Preparedness Plan, including a worker safety plan, must be elaborated upon. A model plan is attached (Appendix C).

1.1.14 Laboratory Management

Laboratory personnel must immediately remove all potted plants from the laboratory to increase quality control.

2) PURPOSE

This project will impact the immediate and sustainable development of the Ukrainian dairy

capacity to further process production through the installation of US processing and packaging equipment. It will enhance the existing and new distribution methods of production, implementation of a "hands on" training program for the Uman dairy and it will establish a new standard of quality for the Ukrainian industry.

The project will revitalize a nearly idle dairy in Uman. The partnership will contribute to the agricultural food processing activities by putting in place a market-supported competition establishing high quality standards. Both the processing facility and training program will contribute to the human and institutional capacity of further development of the dairy industry in Ukraine. Additionally, this project will ease ongoing trade and development opportunities for the US through exposure to and training on US manufactured dairy processing and packaging equipment. In its completion, the project will serve as a model for replication in other regions of the NIS, as the Hincesti project proved in Moldova.

3) DESCRIPTION OF THE PROJECT

The goals of this dairy rehabilitation project are: 1) to increase quality, quantity and the number of various types of dairy products due to proper processing, packaging and storage; 2) to extend the shelf-life of the products; 3) to upgrade an existing dairy plant through the installation of U.S. dairy processing and packaging equipment; 4) to improve entrepreneurial and managerial skills of dairy plant personnel; 5) to enhance the existing and new distribution methods of dairy production; 6) to provide hands-on, technical and managerial training for the Uman dairy; and 7) to establish a new standard of quality for the Ukrainian dairy industry.

In order to improve raw milk supplies, a system of collecting raw milk from private milk farmers will be implemented. One of the main conditions will be providing high quality and quantity of milk. DTR will offer the dairy milk suppliers immediate cash for this milk, plus technical assistance and the equipment on a lease or loan basis. DTR wants to establish 35 milk collection stations where the farms will place their milk for proper refrigeration. The expected production for this activity is 80 metric tons for every 12-hour shift at the dairy.

3.1 LABORATORY

The laboratory for chemical and microbiological analyzes is adequate for measuring product quality and microbiology. New DTR equipment for radiological control has been installed in the laboratory and is functioning. The laboratory is certified by the state as meeting state standards.

Water quality tests are run at the dairy every 1-3 months. Dairy products, and locations throughout the dairy are tested daily for microorganisms. Equipment is adequate for the required testing. Tests for pH, fats, solids, water, lactose, NH3, Na, and protein density are performed to state standards. The small quantities of acids and bases needed for analyzing the dairy products are stored correctly in refrigerators.

In the microbiology lab, 20-30 samples per day can be tested. Previous veterinary tests on the farms are also looked at. Heavy metals, pesticides and radiological contaminants are tested every 1 to

3 months when samples are taken to the State Standard Laboratory in Uman.

State inspectors visit regularly to perform some tests and to check results. An adequate system of checks and balances exists throughout the state structure to assure quality control.

4) ALTERNATIVES INCLUDING THE PROPOSED ACTION

The dairy industry in Ukraine is in crisis. The government subsidies and markets that supported the industry in Soviet times are not now available. Due to the fuel shortages, there has been a sharp decrease in fodder production that has caused declines in herd size and quality. Raw milk availability has become the major problem for the dairies in the country. According to official statistics, the livestock population has dropped to 50% of what it was in 1990. This also resulted in further declines of milk quality, as the dairies are forced to take any available milk for processing. Sixty-ninety percent of cows in the best Ukrainian herds are affected by leucosis, tuberculosis and possibly brucellosis. Uman dairy works at 10% of its capacity due to lack of raw milk. This, and the lack of maintenance, has caused the facility to decline in value and productivity. The lack of working capital, modern packaging equipment and know-how exacerbate the situation. The status quo of "No Action" is untenable. This project, as proposed, will enable the revitalization of the dairy and will result in positive environmental impact for the following reasons:

1) a focus on milk quality beginning with the forage and training of milk-suppliers will result in a significant increase of quality and nutritional value of dairy products. Extension of shelf life, introduction of new products and processes will aid in the establishment of new standards for the Ukrainian dairy industry;

2) proper maintenance and the increased quantity of milk processed will result in high standards of general cleanliness due to an increase in staff requirements and a new management strategy;

3) converting the boiler to natural gas from mazut will reduce pollution in the city of Uman; and,

4) the project proposes to maintain and upgrade the refrigeration system. At present, the continual low performance at the dairy permits no possibility to maintain the ammonia refrigeration system that is in a dangerous state. The dairy is situated within the residential part of the city and very close to an adjacent school and private residences.

5) AFFECTED ENVIRONMENT

Uman, located in the center of the Cherkas'ka Oblast, is situated in the middle of Ukraine and has approximately 100,000 inhabitants. It is a typical rural area devoted to agricultural fields, animal husbandry and some forest plantations. Industries within the town comprise several idle food processing plants and an armament and munition factory that is being dismantled. The town and the adjacent villages are grouped in typical Soviet style with each villager having their own vegetable garden. The climate is typical northern temperate, with July highs of +38^{o} C and January lows of -

35° C. Next to the dairy are homes, garages, a school and a church that make the environmental mitigation measures top priority.

5.1 Biological Environment

Uman is primarily an agricultural region within the forested steppe zone that is naturally forested with coniferous species interspersed with broad-leaved areas of beech, linden, maple, and ash. Soils are diverse, usually forest gray or chernozem. Bird species observed were the grey European crow, black crow (rook), magpies, English sparrows, rock pigeons, and northern chickadees. Partridges, jays and white storks inhabit nearby woods and marshes. There are various raptors and song birds. There is an extensive bio-diversity of fauna in the deciduous forested remnants, which have species such as chestnuts, oaks, hornbeam, birch, some spruce and Scotch pine. Almost all of the land has all been cleared off for agriculture. Some tree plantations serve as wind screens and snow fences made up of primarily of oak species provide firewood. These borders are usually 1-2 rows of trees wide. Woodland lilies, ferns and others may be present, and an occasional Russian Red Code (endangered) species may be present. Common cultivated plants include the Lombardy and other poplars, weeping willows, oaks, maples, basswood, hornbeams, buckeye, elms, beech, some conifers such as black spruce and blue spruce, lilacs, roses, bridal veil, (Table 2).

A partial list of species in Cherkassy Oblast is listed in Table 2.

TABLE 2 A Partial List of Species in Cherkassy Oblast

PLANT LIFE

1. Forest Vegetation

A. Coniferous and *Platyphyllous*-coniferous forests.
   a. Pine Forests (scotch pine and green moss in combination with cereals, lichen, bracken fern).
   b. Oak Pine forests (bracken fern, mixed grass).

B. Deciduous Forests
   a. Oak-hornbeam forests (oak in combination with grass-scarce species, woodruff, common goatweed, sedge, weasel snout, and wild ginger).
   b. Cultivated deciduous forests predominantly with hornbeam, sharp-leaved maple, oak in combination with introduced tree (grass-scarce) species.

2. Flood Plain Vegetation

A. Water meadows (flow and marshy meadows), osier beds, flood plain forests and reservoirs.

3. Park Vegetation

A. Park and forest-park plantations predominantly with sharp-leaved maple, horse chestnut, poplar (black, white and pyramidal), Robinia, linden, decorative shrubs and other species, with remnants of natural vegetation.

4. Orchards

A. Apples, walnuts, plums, sweet cherries, pears and grapes are common orchard species

5. Nursery

A. Some intensive plantations of poplar for firewood were observed.

6. Rare Plant Species

A. Protected by law in the Uman area and perhaps found near Myronivka, include: wood lily, Mumwort, grape-fern, *Platanthera bifolia, Epipactis platyphyllous,* Horsetail (*Equisetum*), Birch (*Betula lectus*), Snowdrop (*Galanthus alba*), *Corydalis* and Dutchman' s breeches.

7. Common Major Species

A. Plants

Cherry Plum (*Prunus divaricata*)
Bird Cherry
Golden Current
Red-berried Elder
Sour Cherry
Blue Honeysuckle
Horse Chestnut
Lilac
Rowan
Hawthorn
Snow-ball
Guelder Rose (*Viburnum*)
Prickly Rose
Black elderberry
Double lilac
European linden
Fine-leaved linden

B. Fauna

1. Mammals

Fox
Stone marten
Wood marten
Otter
Wild boar
Roe Deer
Elk (moose)
Hare
Beaver
Squirrel
Muskrat
Hedgehog
Mole
Mice
Bats

2. Birds

Gray heron
Mallard
Goshawk
Windhover
Hobby
Partridge
White Stork
Gray Owl
Woodpeckers
Chimney swift
Cuckoo
Collared dove
Passerines bird (whitethroat thrush, swallow, sparrow, starlings, finch, gray crow, black crow, chickadees, magpies and others).

3. Reptiles and Amphibians

Widespread mostly in the forest-park zone are:
mud turtle
lizard
grass snake
frog
newt

4. Fish

Lakes and ponds abound in:
carp
tench
loach
perch
roach
rudd
pike
bleak

In the rivers are:
pike
bleak
roach
rudd
gudgeon
bream
shoat
pike
perch
ruff

Up to twenty animal species are entered in the Ukrainian Red Data Book of the International Union for Nature Conservation (IUCN)

5.2 Pollution Situation

The Uman area is affected by the Chernobyl nuclear power plant disaster. According to the contamination map drawn up by the Ukrainian Ministry of Chernobyl in conjunction with the Ministry of Agro Industrial Complex near Uman the level of Cs-137 varies from 40 to 555 Kbq/m^2 (Appendix D). The level of other contaminants (strontium and plutonium) is unknown as the Ukrainian authorities do not provide the appropriate analysis. They state that the content of Sr-90 equals approximately 20% of content of Cs-137. The Ukrainian laboratories in charge of radionuclide analysis are not equipped to analyze even strontium. They are also reluctant to release any information concerning contamination levels. Ergo, a radiation survey is required to assure milk quality. The level of other pollutants including pesticides is considered to be low.

5.2.1 Sewer System

The dairy provides a preliminary waste water treatment using a system of fat traps that is now being renovated and enlarged (photo album Appendix B). Waste water goes to the underground storage tank where fat is separated on several levels. The wastewater then goes to the town's sewerage treatment system. Fat is collected approximately once a week and taken to the fields. Regular tests of water after treatment are provided by the dairy's lab and the municipal water system. Further tests of water quality treatment are performed by city officials from the municipal water

system who visit the dairy once a month to check the system and to take samples for the analysis for solids, fats, temperature and pH. There are no Acts of Infractions against the dairy at this time. It is not known to what degree sewerage treatment is provided by the city. The present system appears to be adequate and meets the demands of this dairy as it was designed for a capacity ten times greater than present effluent levels.

5.2.2 Water Quality

The main source of water used by the dairy comes from the nearby city of Bila Tserkva that is collected in a 70 m^3 cistern. The present daily consumption of 80 m^3 will increase as production is increased. One well has been dug on the property but is used only for the boiler. The dairy has built four cased wells, but the water pipeline has not yet been brought to the site. The laboratory at the dairy provides regular water tests and the quality is in compliance with the standards. An additional purification system is to be installed. Once a month, bacteriological tests are run and checked by the official administrator from the government. Currently, the water meets the coliform standards of <3 coliform per milliliter. One of the largest environmental concerns of DTR is the water quality; they are certain that additional water filtering would improve the water quality.

5.2.3 Basic Sanitation

The general overall cleanliness has improved significantly with the management of DTR. The floors of the dairy are clean and no odors were present. The outer patio for loading needed to be washed down. Spills are cleaned up immediately. The floors and equipment are washed down after each shift with tepid water. This water is then cooled and recycled, although to what extent is not known. The insulation on pipes inside the building was adequate. The plant was built in 1964. All the tanks, machinery etc. appeared to be clean.

5.2.4 Waste Disposal

It is recommended that DTR/Uman follows a similar program as DTR has in the Hincesti plant in Moldova. In Chisinau, at the Hincesti plant, waste paper is recycled, although there may be a problem with wax paper. Less than 0.1% of plastic cups are wasted. Initiation of production will produce more waste while the staff is being trained. All recyclable wastes are placed in steel bins for disposal at the municipal land fill.

5.2.5 Animal Health

There is a district veterinarian health service from Uman, which is provided to each dairy once a month. Certificates of animal health are issued monthly. If diseases, such as tuberculosis, leucosis or brucellosis, are discovered at any of the 40-50 farms, transfer of milk from that farm to the dairy is prohibited until negative disease findings are issued for that farm by the Veterinarian Health Service. The “best” of the 27 farms servicing the dairy was visited (Photo Album Appendix B). The herd had been decimated because:

1) the economy was not able to support the original herd size;

2) insufficient fuel in the fall of 1997 prevented an adequate harvest, resulting in severe starvation of the animals;

3) tuberculosis, brucellosis, and leucosis disease plagued the herd, endangering public health;

4) the infrastructure was in disarray and disintegrating rapidly;

5) the milking equipment was antiquated and dirty;

6) the transportation equipment was old, worn out, with many breakdowns; and

7) drainage away from the barns was inadequate and needed cleaning.

It would appear that this "best herd" has great potential to significantly affect the human population in a negative way with these highly contagious diseases.

5.4.6 Boilers and Air Quality

The boilers used for heating water and space in the dairy are antiquated and use a heavy tar-diesel mixture of mazut fuel (Appendix B Photo Album). This is the cheapest fuel available. Three mazut boilers that do not run at full capacity are used for heating the plant. Previously, the boilers heated all the adjacent dwelling houses; now they sell heat to another plant. The ensuing air contamination caused by the burning of mazut creates a serious environmental problem. Estimated air pollution for 1997 includes: particulate matter - 1.145 tons per year,

NO_2 - 5.030 tons per year,
CO - 21.303 tons per year,
SO_2 - 78.547 tons per year.

These emissions are not within air quality standards.

There are subterranean and surface storage facilities with 500 tons capacity for mazut. At present 75 tons of mazut are in stock. Significant spillage was present. The dairy has begun to convert the boilers to natural gas in order to reduce pollution and other boilers are being renovated. A natural gas line has been brought to the property and DTR would like to complete the construction.

The dairy has a fleet of 13 vehicles, including four milk trucks, one delivery truck and one tractor. There is no storage for fuel on the property.

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5.2.7 Cold Room Storage

During the first visit in April, 1998, the plant was running at 10% or less capacity and the cold storage room was almost empty after the morning processing. Additional freezer space will be needed when the plant begins making ice cream. Since DTR began operations, significant increases in production are occurring. These products need to be stored correctly in the rooms with alleys and

open space adjacent to the walls to assure cold air circulation.

5.2.8 Ammonia Refrigeration Management

The ammonia refrigeration system was constructed approximately 30 years ago using the standard design at that time. The system has been enlarged with the increase of production and now consists of 8 compressors. The mechanic shop was in disrepair and does not provide proper maintenance and repair of the system. The last repair done was 6 years ago. Pipelines are rusty and corroded and in need of painting with bright yellow non lead paint for easy identification. There are numerous leaks resulting in strong ammonia odors. There are no ammonia warning detectors present and gas masks were not visible. The cooling system outside lacks a berm to protect the pipes and storage tanks. DTR plans to rebuild the mechanic shop, build a new pipeline and change the condensers and evaporators. This rehabilitation will support the increased production of yogurt and ice cream; the present system is incapable of handling increased production
.

The cooler units are ammonia driven. The dairy has an emergency preparedness plan in response to the possible leakage of ammonia, which is attached as Appendix C. In addition they have a manual on proper usage of ammonium systems according to Soviet State Standards. Personnel from the Chemical-Technological Inspection team are supposed conduct regular bi-annual inspections and unannounced inspections several times a year. Further detailed information on ammonium management can be located in the Bibliography. DTR has requested from CNFA more information regarding ammonium management and the purchase of the ammonium warning devices.

Ammonia (NH_3) is a colorless gas with a strong, penetrating odor. It is one of the more common industrial chemicals. In its aqueous form as ammonia hydroxide (NH_4OH), it is extremely alkaline and highly caustic. Mild to moderate exposure to ammonia can cause headaches, salivation, burning of the throat, anosmia, nausea, vomiting and substantial pain. Spasms of the larynx and bronchial tubes can also be caused by moderate doses. The National Institute for Occupational Safety and Health (OSHA) standard for ammonium inhalation is 50 ppm as an 8-hour time weighted average, but the OSHA has recommended that 50 ppm be a 5-minute ceiling for exposure. The Soviet standard is significantly more strict at 28 ppm. Most persons can detect an odor of ammonium at 30 ppm; some at 5 ppm..

At high concentrations, ammonium is explosive. If the plant is well ventilated, it would be impossible to get an explosive mixture of ammonia and air. The ignition temperature must be above 630^{o} C. Gas detectors should be mounted in the refrigeration rooms to give an alarm when concentrations are above 50 ppm. In most systems, the gas detectors activate an alarm, the mechanical ventilation or a water spray system. There have been instances of ammonia poisoning of milk when the liquid ammonia from a refrigeration unit leaked and sprayed about a milk cold storage room for an undetermined number of hours. Personnel in refrigeration rooms should be trained in emergency preparedness.

Advantages of ammonia usage:
* higher energy efficiency in most temperature ranges
* great tolerance to water contamination
* simple and immediate leak detection

* no ozone depletion potential
* lower refrigerant cost
* smaller pipe dimensions leading to lower plant investments

Disadvantages which must be considered:
* possible food contamination from leaks in the refrigeration system
* toxic at low concentrations in the air
* no tolerance to some materials e.g. copper

Recommendations for ammonia spills are as follows (Appendix C presents a more detailed plan):

1. following ammonia ingestion, a conscious person should immediately be given large quantities of water to dilute the ammonia;

2. persons who have inhaled ammonia should be observed closely for visual disturbances, upper airway obstruction, and hypoxia;

3. the area of the ammonia spill or leak should be ventilated to disperse the gas. A flow of gaseous ammonia should be stopped; liquid ammonia should be allowed to vaporize; and

4. persons not wearing protective equipment and clothing should be restricted from areas of spills or leaks until the clean up has been completed.

Correctly designed small refrigeration plants with ammonium as refrigerants can replace CFC, HCFC and other artificial refrigerants and can lend to considerable reductions in energy consumption, with savings up to 15%. Ammonium refrigeration is a mitigation for ozone depletion.

6) ENVIRONMENTAL CONSEQUENCES

Providing high quality dairy products to the populace of Ukraine, and increasing production of basic nutritious food are significant positive impacts to the environment of Ukraine. Increased production has several multiplier effects on the environment and the economy. Dairy farms running far below capacity, as is the case in Ukraine, are damaging the environment. Idle machinery and idle farm land do not generate capital with which to maintain the machinery nor land, and a rapid and massive degradation of the resource occurs as pauperized citizens become desperate. In order to survive, they strip the infrastructure of its patrimonial accumulations. Dairy farmers have no markets and reduce their herds. The dairy herd genotypes tuned to specific areas through selective breeding disappear. Insufficient revenues from the sale of raw milk forces the use of fertilizers to be discontinued for forage crops and pastures. Nutrient imbalances in the soil can have long term negative effects. The absence of income forces abandonment of farms and ethnographic changes cause crowding in the cities and massive unemployment. All of this is happening today in Ukraine as a function of the shutdown of agriculture.

The DTR project is making a significant improvement within the local situation in the Uman

region, especially in the development of private business. The upgrading of the dairy by importing modern technologies will be accompanied by the technology of greater sanitation and better management, as at the Hincesti dairy rehabilitation project in Moldova. Since DTR began work, the dairy is cleaner, and the boiler units are being repaired. The re-equipped laboratory guarantees quality control. Liquid effluents from the facility increased, but since the dairy is still not operating at designed capacity, the sewer system is not overly taxed. DTR has expressed willingness to comply with all the environmental mitigations, and is proactive in environmental protection.

7) LIST OF PREPARERS

Dr. Wayne T. Williams is currently the Environmental Officer for Citizens Network for Foreign Affairs projects in Kiev, Ukraine. He has extensive experience in the Environmental Assessment field, successfully completing several dozen Environmental Assessments for USAID in Central America from 1991 through 1995 in his capacity as Regional Environmental Advisor for USAID/ROCAP in Guatemala. These and other Environmental Assessments completed by Dr. Williams covered the widest possible range of topics including dairies, canning plants, slaughter houses, chemical warehouses, medical clinics construction, solid and liquid waste disposal, public health and other projects including large and medium sized industrial operations, including electrical power generating plants. Dr. Williams has designed, built and supervised several technical laboratories. He has conducted extensive agricultural research on plant nutrition with macro and micro nutrients.

Zoya Drozdova is an Environmental Assistant for Citizens Network for Foreign Affairs projects in Kiev, Ukraine. She holds a Masters Degree in Chemistry with a Minor in Science Education. She has assessed several dairy projects in Ukraine and other Agribusinesses for environmental impacts and mitigations.

Jo Anne Williams has written, edited and published numerous scientific and technical reports . She has a Bachelors Degree in Environmental Studies and Planning from Sonoma State University, California. She is on contract to CNFA.

8) BIBLIOGRAPHY

1) MMWR. Vol 35(16) 1986. V. Ammonium Contamination in a Milk Processing Plant. Wisconsin. Internet.

2) Rules of Organization and Installation and Safe Operation of Ammonium Refrigeration Systems. Under the Auspices of the State Commission of the Soviet of Ministries of the USSR on Foodstuffs and Purchasing. Main Scientific Technical Department. Scientific Products Association. 7th edition. Moscow. 1991.

3) Environmental Assessment. Hincesti Dairy Rehabilitation Project. AP-I Moldova. CNFA-Kiev Environmental Office. Nov. 1997.

4) Law of Ukraine. Environmental Standards for Radionuclides.

9) APPENDICES

A. Initial Environmental Evaluation
B. Photo Album
C. Ammonium Management Emergency Action Plan in English and Russian
D. Maps of Region
E. New Ukrainian Law Regarding Radiation Content of Food
F. Protocols for Radiation Monitoring